DOCUMENT RESUME

ED 233 122 UD 023 051

TITLE Evaluation of the Computer Assisted Instruction Title I Project, 1980-81.
INSTITUTION Metrics Associates, Inc., Chelmsford, MA.
PUB DATE [81]
NOTE 97p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Achievement Gains; Comparative Analysis; *Computer Assisted Instruction; Elementary Secondary Education; Mathematics Achievement; *Mathematics Instruction; *Program Effectiveness; Program Evaluation; Reading Achievement; *Reading Instruction
IDENTIFIERS *Elementary Secondary Education Act Title I; Massachusetts

ABSTRACT

For the third year, six Massachusetts communities incorporated computer assisted instruction (CAI) into their regular Title I programs, for students in grades 1 through 9. It was hoped that CAI would produce reading and mathematics gains over and above those which are characteristic of more conventional Title I instructional approaches. A pretest, posttest quasi-experimental research design was employed to determine the program's effectiveness. Title I students were assigned to treatment (CAI) and control (or comparison) groups. All participating students received 30 minutes per day of Title I instruction in reading and/or mathematics; students in the CAI group spent 10 of those 30 minutes interacting with the computer system. Data were analyzed across and within grade levels. Students in the CAI groups were found to demonstrate significantly superior performance to non-CAI students in reading, and superior (but not statistically significant) performance in mathematics. The uniform results obtained were attributed to the high degree of design compliance in the past year, as compared to previous years of the program's operation. (GC)

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EVALUATION OF THE

CAI

COMPUTER ASSISTED INSTRUCTION

TITLE I PROJECT

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ABSTRACT

For the third year, six communities in Massachusetts incorporated computer assisted instruction (CAI) in their regular ESEA Title I programs. The reason for doing so was to determine whether the use of CAI would produce achievement gains over and above those which are characteristic of more conventional approaches to Title I instruction. If the incorporation of CAI in conventional programs were to show itself as an effective means for increasing the reading and/or mathematics knowledge and skills of Title I children, then the adoption of CAI in similar programs would be indicated.

A pretest, post test quasi-experimental research design was employed to determine whether the addition of CAI had been effective in terms of achievement gains during the program year. Students serviced in the regular Title I programs in the six communities which participated in the program were the subjects for the study. Sixteen CAI learning sites were established in the six participating communities. Where possible, students were assigned to treatment groups at random. Where random assignment was not possible, comparison groups were formed using students in comparable and neighboring schools. Though the communities involved in the program did not constitute a random sample of Title I programs nationwide, they are reasonably typical of the spectrum of programs in operation elsewhere.

Students in both treatment groups received 30 minutes of Title I instruction each day in reading and/or mathematics. As part of their daily Title I instruction, students in the CAI group spent 10 of the 30 minutes interacting with the computer system.

Data were analyzed across grade levels, and for the following groups of grade levels: 1-2, 3-4, 5-6, and 7-9. Pre and post test data from the Metropolitan Achievement Tests (Metro 78) were analyzed using analysis of covariance; t-tests were also performed between gain scores for students in each group. Normal curve equivalents (NCE's) were used as data in all analyses.

It was found that the CAI treatment was superior to the non-CAI treatment for students in reading as reflected by highly significant differences which favored the CAI treatment. Differences noted in mathematics favored the CAI treatment in nearly every case, but in many instances were not statistically significant.

The uniform results obtained, which favored the CAI treatment in nearly every case, were attributed to the high degree of design compliance in the past year as against previous years of the program's operation.

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I. INTRODUCTION

Beginning in 1979, six communities in northeastern Massachusetts began a program which incorporated Computer Assisted Instruction (CAI) in their regular ESEA Title I programs. CAI has been regarded as having at least two rather distinct advantages as an adjunct to traditional methods of teaching. First, CAI facilitates diagnostic and prescriptive teaching. Second, it makes possible immediate reinforcement for each student who uses it.

The approach to teaching which emphasizes diagnosis of student needs and individual prescription of learning activities to meet those needs has been found to be desirable in terms of measured student outcomes. Instruction becomes more individualized and focussed through the development of specific instructional plans which are based upon each student's measured strengths and weaknesses. As shall be described later, CAI provides facilities which serve to make the implementation of diagnostic and prescriptive approaches to instruction easier for teachers and administrators.

Much like a tutorial session, CAI provides the capability to reinforce correct responses by students immediately, rather than following periodic examinations. Material is presented to each student in small chunks which have been very carefully organized in a series of curriculum "strands" each of which has been age graded. Depending on what type of response a student makes to the system, the material next presented to him is appropriate. That is, a correct response results in reinforcement and a move to the next piece of material within a given strand. On the other hand, an incorrect response will result in remedial material being presented next in an effort to correct whatever misunderstanding caused the incorrect response to be made in the first place.

The system also compiles information about each student's performance within each curriculum strand, as the student performs. The information compiled by the system while a student interacts with it serves to guide the lesson being presented. It also allows reports to be generated for teachers concerning areas of growing strength or areas of continued weakness so that professional judgements may be made about a prescription currently being used for a student. While such record keeping and data gathering would be difficult or impossible for individual teachers to perform, the CAI system performs both functions automatically, and produces reports based upon the information gathered at the touch of a button or two.

During the past year, measurements employed in the program have included formal and informal professional diagnosis of learner needs, standardized measures of achievement administered as pre and post tests, the gathering of information via questionnaires from the several publics which the program involves, and professional observations. The use of this mix of measures served to facilitate both formative and summative evaluation which was specific to each student and which allowed judgements to be made concerning the success of the program as a whole.

PARTICIPATION AND SPONSORSHIP

Six school systems in the Merrimack Valley area in Massachusetts participated in this year's program: Billerica, Chelmsford, Dracut, Lawrence, Methuen and Woburn. Learner sites were established within each community at which students interacted with the CAI terminals as part of their regular Title I programs. In all, 16 school sites implemented the system using a total of 64 terminals. Table 1 presents information concerning how the CAI terminals were distributed among the several learner sites.

Since its inception, the CAI project in the Merrimack Valley has been organized and implemented by the Merrimack Education Center (MEC) in Chelmsford, Massachusetts in cooperation with Instructional Systems, Incorporated of New Jersey and the Computer Curriculum Corporation of California.

PROBLEM TO BE INVESTIGATED

The question to be answered by this research was: do students who experience regular Title I services plus CAI interaction achieve at a higher level in reading and/or mathematics over the course of the program year than students who receive only the regular Title I services? The criterion measure of greatest importance in answering this question was the Metropolitan Achievement Tests, Metro '78, Survey Component, Basic Battery which was administered as a pretest and as a post test.

SIGNIFICANCE OF THE PROBLEM

If it can be shown that CAI is an effective means of increasing the reading and/or mathematics knowledge and skills of children in Title I programs, then adoption of the approach in other programs in the state and across the country would be indicated. Given favorable results for CAI, its apparent cost-effectiveness could be taken advantage of allowing teachers and machines to work together producing a more effective learning environment for children. Teachers would benefit as well by being relieved of some tedious aspects of their profession and would be provided with highly effective reporting techniques for their students.

Table 1

Installation of Remote Terminals
to CAI Project

System	School	Number of Terminals
Billerica	Talbot	4
	Vining	4
	Dutile	4
	Ditson	4
	High School	4
Chelmsford	Westlands	4
Dracut	Middle	4
Lawrence	Hennessey	4
	Leonard	4
	Leahy	4
	Tarbox	4
Methuen	Central Elementary	4
Woburn	White	4
	Linscott	4
	Clapp	4
	Kennedy Jr. High	4
Totals 6	16	64

PROGRAM AND DESIGN LIMITATIONS

Though every effort has been made to ensure that the results obtained in this research will be dependable and informative, certain limitations in the design could not be avoided and should be born in mind by the reader. The principal limitations centered on uniform random assignment of students to program groups for comparison purposes and the manner in which the six participating communities were selected.

Federal law required that students who receive services under Title I must be selected on the basis of greatest need. The design selected for this research was a pretest post test control group approach employing analysis of covariance as the principal analytical tool. However, such a design requires that students be assigned to treatment groups on a random basis. Given the restrictions of federal law, random assignment of students to groups was only possible at some of the learner sites. Also, certain geographic, student scheduling and funding constraints required that grouping of students to receive treatments in many cases could not be at random.

Thus, the design must be regarded as quasi-experimental rather than experimental in a strict sense. The term "comparison group" is used throughout the text rather than "control group" to empnasize this fact. The comparison groups employed were constructed in such a manner as to obviate, or at least greatly reduce, the limitations imposed as a result of incomplete random assignment of students to groups across the design. Specific steps taken will be described in greater detail later in the report.

It should also be pointed out that the communities which participated in the study were not selected at random from some larger population of schools supporting Title I programs. To make the project feasible, only those schools within a reasonable distance of the central computer and the organization sponsoring the project could be included. Thus, technically, the results given in this report apply only to the school systems which participated in the program. The several learner sites which were involved represent a rather good cross section of schools with Title I programs across the country so logical generalizations of the results here reported do not appear unwarranted.

II. PROGRAM NARRATIVE

Section II of this report presents a description of the manner in which the program operated during the course of the 1980-1981 school year. Since the overall program objective remains the same, i.e., to determine whether the CAI treatment produced a measureable and statistically significant effect on the cognitive growth of students in reading and/or mathematics over and above that which attaches to conventional instructional approaches in Title I, it is important that the reader have a clear understanding of what the program involved on a day to day basis. Only with such an understanding may proper interpretations be made of the results later reported.

PROGRAM STRATEGIES

The program strategies employed in this year's program remain unchanged from previous years. They are:

1. tutorial or small group sessions for each child;
2. complete and appropriate use of diagnostic measures for all students;
3. use of specific, behaviorally stated objectives against which program progress could be measured;
4. allowing each student to progress at his or her own speed;
5. in-service training for faculty;
6. home-school cooperation and communication;
7. individual student interaction with the CAI system on a daily basis for approximately ten minutes;
8. use of additional system generated diagnostic information about placement and progress within curriculum strands for teacher evaluation and modification of learning prescriptions;
9. optional entry level depending upon initial experience and CAI system diagnostic information;
10. widely varied curricula for enrichment depending upon student needs and capabilities;
11. summative and formative evaluation information generated continuously by the CAI system.

LEARNING SITES

Six school districts participated in this year's program as in the past years of its operation. Within each district, sites were designated in which the computer terminals would be located. Additional sites within these districts served to provide comparison group students where sufficient numbers of serviced students did not exist at a CAI site to allow random assignment of students to treatment groups. In all, 16 CAI sites were established and another 21 sites supplied comparison students at appropriate grade levels. At each of the CAI sites an average of 41 students was serviced.

Four cathode ray tube (CRT) terminals with keyboards were installed at each of the 16 CAI learner sites. Students interacted with the computer system via these terminals. Reports for teachers and administrators were regularly prepared using a printer unit located at each CAI site. These reports were used in judging the progress of individual students and in judging the efficacy of the program at that site on a periodic basis. Both the individual and group reports played an important role in guiding the program at each site.

All the computer equipment located at a given site was connected to a cluster control unit which in turn was connected with the host computer at the Merrimack Education Center via telephone lines.

In most cases, the CAI learning site was a part of the general Title I instructional area. In some schools, considerable ingenuity was brought to bear to find space which could be dedicated to housing the necessary equipment. This resulted in some novel locations in some cases, but in every school the site was convenient and clearly adequate to its purposes.

On a daily basis, children who had been designated to receive the CAI treatment and who were participants in the regular Title I program in that school came to the learning site in small groups according to a previously arranged schedule. Students would spend about 30 minutes each day at the CAI site. They would interact with the terminals for approximately 10 minutes during each such session. The remaining 20 minutes would be spent in tutorial or small group sessions under the guidance of a Title I teacher and teacher aide. In order that the equipment and people involved could be used to maximum efficiency, two or three CAI sessions occurred during each 30 minute class.

Thus, the variable whose effects were being assessed was the fact that about half of the students in the overall program were allowed to interact with a CAI terminal for 10 of their 30 minutes of Title I instruction each day while the other half were not. Programs were carefully arranged so that each student, whether designated to receive the CAI treatment or not, received about the same amount of Title I instruction.

CAI SYSTEM OPERATION AND INTERFACE

Given that the computer systems used at the learner sites are complex and represent many man-years in their development, one might expect that elementary school children would have difficulty operating them or might be intimidated by them. This was very far from the case. As complex as the system is, interacting with it is simple and enjoyable. Those students who were new to the program this year had no difficulty at all in adjusting to the terminal sessions. They were eager to begin each session and reluctant to end each session. Operation of the terminal was learned quickly, in large part due to the simplicity of the terminal and its keyboard and in part due to the interactive nature and prompts which are built into the system.

Adults tend to be more intimidated by computers than are children so it might have been reasonable to expect that teachers and aides would have had difficulty using the system. That expectation also was not fulfilled. The operation of the system was simple for teachers to learn and by their admission was easy to interact with on a daily basis. Thus, it seems reasonable to conclude that the computer system interfaced well with its human users and the school settings in which it was located.

REPORT GENERATION

A wide variety of reports is made available to teachers by the computer system in an effort to assist teachers in diagnosing student difficulties so that appropriate action may be taken, either by altering the curriculum strands with which a student interacts, or by providing special drill and practice in the small group and tutorial sessions held following each terminal session. Any of the reports can be produced on the CRT for quick inspection or can be hard-copy printed if a permanent record is required. Each report is produced with only a few simple commands.

The reports which teachers found to be most useful were the gains, grouping, and course reports. The computer system maintains its own internal scoring system, reported as a grade equivalent, and is continually updating each student's record within each curriculum strand as the student inter-

acts with the system. This means that a teacher could easily obtain a summary of each student's progress including his or her current status in each of the several curriculum strands which constitute a CAI "course". One reporting mode prints only those strands in which growth has been atypical within the specified period of time. This kind of information is extremely useful in modifying an individual student's prescription on a periodic basis. Another reporting mode generates grade level and time gains for each month and for the current year.

Teachers and administrators agreed that the reports were very useful to them in their decision making roles and that they were easily produced.

COURSEWARE

Several programs of instruction are made available by the computer system. Collectively these are referred to as "courseware". Each course consists of several "strands", each of which is age graded in terms of its content. This approach to organizing each course allows the system to keep track of each student on the system's internal grade equivalent scale and provides the raw material for generating the reports which the system makes available for use by teachers and administrators involved in the program.

Courseware for the CAI system was prepared in a format developed by Dr. Pat Suppes of Stanford University, and is currently marketed by the Computer Curriculum Corporation.

The instructional strategy employed is drill and practice. First, a concept is introduced by the instructional staff. Discussion of the concept and examples are given to the student in tutorial and small group sessions. The student then receives drill and practice at the CAI terminal. As the student interacts with the CAI terminal, the system checks his response to each question or problem and then automatically adjusts the level of difficulty of the exercises which follow to match the student's current level of mastery. Simultaneously, the system maintains an ongoing record of each students's progress, his strengths and weaknesses, in each of the curriculum strands which collectively constitute a course witnin the systems's courseware library. Individualized hard copy worksheets may be produced for each student based upon these records. The information thus generated is available to teachers and administrators for report generation purposes to aid in the planning of future instructional sessions.

If desired, reports may be produced which span all children at a given site, within any group of sites or for the system as a whole. By producing such aggregate reports, teachers and administrators can gain valuable information concerning the progress of the program within their own school, and can gain insight into ways in which the overall program might be improved. In this manner, the system serves the needs of both formative and summative evaluation.

COMPATIBILITY

The CAI treatment herein described was made a part of the regular Title I programs in operation at the sites where CAI equipment was installed. It would be natural to assume that problems might arise as a result of this combination of programs, personnel, equipment and purposes. However, little if any interference between the two approaches was noted at sites which supported both. Students all received their regular tutorial or small group instruction in the designated instructional area on a daily basis. Likewise, they interacted with the computer system on a daily basis. The two approaches appeared to work well in combination, due probably, to the excellent cooperation among teachers who served both the regular Title I program and the CAI program. There appeared to be little reason to doubt that the two approaches were compatible given the experiences of the past year, indeed, of the past three years.

STAFF DEVELOPMENT

A staff development program has been maintained in each of the three years that the project has been implemented. In the first year there was a need to introduce all personnel to the CAI system, inform them concerning the purposes of the program, its capabilities and limitations, and give them step by step hands on experience with the system prior to their guiding students in its use.

During the second and third years, entry level training was provided for 12 to 15 staff members who were new to the project, replacing the Title I teachers from the previous year as part of the local district's staff reduction policies.

District wide meetings and inter-district workshops were provided regularly to serve the needs of all professional staff involved with the implementation of the program. These staff development activities focussed on integration of the CAI component into the regular Title I program, evaluation design compliance, course revisions and system updates introduced by the vendor. Follow up to these sessions was accomplished through on-site visitations. Staff from the Merrimack Education Center, Instructional Systems, Inc., and members of the Metrics evaluation team participated in the staff development effort.

PARENT INVOLVEMENT

One of the central purposes of the program is to make parents of the children become knowledgeable participants. This year, as last, efforts were made to involve parents at the outset of the program year and throughout its continuation.

Parents were invited to attend their school to view the CAI system in operation, were given demonstrations while at the school, and were regularly consulted concerning the attitudes which their children expressed at home about their experiences with the CAI system. Parents were also polled for their opinions at the conclusion of the program year. Their comments and responses are presented in a later section of this report (see appendices).

III. PROCEDURES

PRODUCT OBJECTIVE

Students experiencing regular Title I services plus CAI interaction will give evidence of greater achievement in reading and/or mathematics as measured by the Metropolitan Achievement Tests, Metro '78, Survey Component, Basic Battery over the course of the program year than will students who receive regular Title I services only.

STUDENTS PARTICIPATING IN THE STUDY

A total of 1067 students participated in the study overall. 36 school sites were part of the program in 6 school districts. Of these sites, 16 had the computer equipment installed. In some cases, the sites which were selected to constitute the comparison groups were within the same school building which housed the children who received the CAI treatment. At these sites, children were assigned to one treatment group or the other at random. However, in some other cases, students in sufficient numbers to construct both a CAI group and a comparison group within a given building were simply not available. In such cases, students from neighboring schools which were comparable in virtually all respects were selected to constitute a comparison group. Where this was done, students obviously could not be assigned to treatment groups on a random basis. In an effort to minimize the effects of this design limitation, students who would constitute the comparison groups at each grade level were deliberately and carefully chosen and groups were tested using the criterion measure as a pretest to determine whether the groups were significantly different. Where possible, outliers were identified and eliminated so as to make the experimental and comparison groups as alike as possible at the outset of the program year.

Clearly, assignment of subjects to treatments was not truly random across the entire design. On the other hand, the resulting CAI and comparison groups were sufficiently alike at the outset of the year's activities that they may safely be considered to have been comparable. The only constraints imposed upon assignment of students to groups were those inherent in the geographical location of equipment and certain requirements imposed by the federal government as a condition of funding the project.

Also, the communities involved do not represent a random sample of communities across the nation. However, the communities involved differed little, in any recognizable way, from those in which Title I programs operate across the nation.

INSTRUMENTS

Children who participated in the program were selected on the basis of standardized test scores, recommendations by teachers familiar with them, and other criteria agreed upon by all personnel who served the program. Furthermore, the selection criteria were comparable from school to school and among the school districts which participated in the program. The standardized tests used in the selection process were not the same instruments which were later used as dependent variables in assessing the degree to which the program had been effective, thus minimizing any effects due to regression.

Several measurements were obtained for each student who participated in the program. Principal evidence concerning attainment of the program's prime objective was obtained using the several scales of the Metropolitan Achievement Tests (Metro 78) Survey Component, Basic Battery. Appropriate forms and levels of the Metro 78 were used in testing all students who participated in the program.

The Metro 78 was administered as a pretest in October in all the participating school sites. Post testing was accomplished the following May using the same test battery in its appropriate levels and forms. Virtually all pre and post testing took place as planned and all assumptions on which norms for the instruments are based were met.

The prime objective of the study had to do with achievement gains so the achievement tests constituted the principal criterion against which the success of the program was to be judged. However, outcomes other than achievement were of importance as well. Thus, additional data were gathered on each student participant using a variety of techniques.

It was planned that students would receive the CAI treatment for 10 minutes per day (aside from students in grades 7, 8 and 9). The total exposure to Title I services on a daily basis was fixed for each child as well, being either 30 minutes 5 days per week or 45 minutes 4 days per week depending upon grade level. To be certain that these guidelines had been adhered to, a log was maintained at each learner site, containing a record of the number of days the Title I program was in operation, the number of days each student received Title I services, the number of days the computer was in operation at CAI sites, and the number of days during which the computer equipment was down. This information was helpful in determining the extent to which certain program goals had been met during the course of the program year, and in making treatment groups as comparable as possible in terms of their exposure to the treatments.

Questionnaires were constructed to assess the views of parents and professionals who participated in the program. Administrators, teachers, aides and parents were all polled with respect to their views of the effectiveness of the program, its strengths and weaknesses. Copies of these instruments are included in Appendix C.

METHOD AND DESIGN

The purpose of the program was to determine whether the introduction of CAI as an adjunct to regular Title I instruction would have a positive effect upon student achievement beyond that expected from the conduct of regular Title I services which did not involve the use of computers. Two groups of students at several grade levels were compared in terms of their relative gains in achievement using a pretest post test quasi-experimental research design. Students in the CAI group interacted with computer presentation devices for a portion of their regular Title I instruction on a daily basis. Comparison group students received only the services regularly associated with Title I programs.

Random assignment of students to treatment groups was not possible in many cases in order that the Title I funds used to support them were appropriately distributed among students intended to receive them in accordance with federal guidelines. Certain conditions of funding required that at least 40 students were serviced by the computer equipment installed at each CAI site. In some schools, the available number of students eligible to receive Title I services was not large enough to support both a CAI group of at least 40 students as well as a comparable sized comparison group. In such schools, it was necessary to assign all, or nearly all, available and eligible Title I students to the CAI treatment group. Students who would compose a comparison group had to be sought elsewhere. In such cases, a comparable school within the same community, also targeted to receive Title I services and with similar demographic characteristics, was employed.

The treatments given the two groups were as follow:

1. The experimental group received 30 minutes of Title I instruction on a daily basis. During their daily session, each of these students interacted with the CAI system for 10 minutes (except as noted later), the rest of their time being spent in tutorial or small group sessions with Title I teachers and aides.

2. Students in the comparison group also received 30 minutes daily of Title I instruction. However, they did not interact with the CAI system.

As a result of their group assignment, students differed in terms of their exposure to the CAI system, but not in terms of the total amount of time they spent engaged in receiving Title I instruction. The critical variable studied in this research, therefore, was how the daily Title I instructional session was spent, not the total amount of time spent receiving instruction. Figure 1 presents a summary of the design used.

Tables 2 through 5 show numbers of students in each treatment group, at each grade level, within each school system. In previous years, the numbers of students originally targeted for inclusion in the program differed from the numbers actually served. This year, most of the problems which caused the attrition have been solved so that the numbers of children shown in Tables 2 through 5 were quite stable throughout the program year.

STATISTICAL ANALYSES

Data obtained from students who participated in the program were analyzed on a pre and post test basis to determine whether the CAI treatment produced achievement gains in excess of those observed for members of the comparison group over the course of the program year.

Ideally, analyses would have been carried out at each grade level as well as for all grade levels combined. As a practical matter, sufficient numbers of students did not exist at all grade levels which would make their individual comparisons meaningful. Therefore, grade levels were grouped such that sufficient numbers of children were present in each treatment group and so that the groups could be considered comparable at the outset of the program year. For reading comparisons, the groups used were grade 2, grades 3 and 4, grades 5 and 6, and grades 7, 8, and 9. Some 6th graders from the Middle School in Dracut were also included in the grade 7 through 9 group as their exposure to the CAI treatment corresponded to that which characterized grade 7 through 9. That is, each Title I session was 45 minutes in length and CAI terminal sessions were 15 minutes in length. For mathematics comparisons, grades 1 and 2, 3 and 4, and 5 and 6 were combined for analyses.

For each student, raw scores and scaled scores were obtained as raw data. The scaled scores were, in turn, converted first to percentile ranks and then to normal curve equivalents (NCE's). As a consequence of using NCE scores in all analyses, any combination of grade levels within the same subject area could be legitimately analyzed as a unit.

Figure 1

Evaluation Design for
Reading and/or Mathematics
by Grade Level

Achievement Outcomes

Group	Assignment+	Pre* Test	Title I Treatment	Post* Test	Description of Students
Experimental	Random Where Possible	Metro 78 October	CAI and Regular Title I	Metro 78 May	Eligible with greatest need
Comparison	Random Where Possible	Metro 78 October	Regular Title I	Metro 78 May	

+ In several cases, random assignment of students to treatments was not possible. See text for explanation.

* Metropolitan Achievement Tests, Metro 78, Survey Component, Basic Battery.

TABLE 2

CAI (Experimental) and Non-CAI (Comparison) Groups

Grades 2-9 Reading

	Grade	Group	Billerica N	Chelmsford N	Dracut N	Methuen N	Woburn N	Totals N
Reading Group 1	2	Exp	32	0	0	9	14	55
		Com	0	19	24	18	15	76
Reading Group 2	3	Exp	15	9	0	8	9	41
		Com	0	13	10	25	14	62
	4	Exp	28	1	0	8	10	47
		Com	0	1	8	20	15	44
Reading Group 3	5	Exp	14	3	0	10	7	34
		Com	0	12	16	15	16	59
	6	Exp			38*		9	9
		Com			0		7	7
Reading Group 4	7	Exp			31		0	69
		Com			0		9	9
	8	Exp					0	0
		Com					20	20
	9	Exp	16				0	16
		Com	11				6	17

* Dracut grade 6 students will be included in the grade 7-9 design since their program is comparable to grades 7-9 (e.g., length of daily sessions, etc.)

Table 3

CAI (Experimental) and Non-CAI (Comparison) Groups

Grades 1-6 Mathematics

	Grade	Group	Billerica N	Chelmsford N	Methuen N	Woburn N	Totals N
Math Group 1	1	Exp	5	0	0	12	17
		Com	0	24	0	20	44
	2	Exp	2	10	5	9	26
		Com	0	16	12	18	46
Math Group 2	3	Exp	19	0	4	5	28
		Com	0	14	13	14	41
	4	Exp	28	4	7	7	46
		Com	0	12	17	14	43
Math Group 3	5	Exp	15	4	9	13	41
		Com	0	17	13	10	40
	6	Exp				15	15
		Com				6	6

Table 4

Lawrence Reading Program

CAI (Experimental) and Non-CAI (Comparison) Groups

	Grade	CAI N	Non-CAI N
Reading Group 1	2	4	18
	3	31	56
	4	50	12
Reading Group 2	5	26	38
	6	30	22

Table 5

Lawrence ESL Program

CAI (Experimental) and Non-CAI (Comparison) Groups

	Grade	CAI N	Non-CAI N
Language Arts Group	4	12	22
	5	13	13
	6	11	9

The principal analytical tool used in analyzing the data was analysis of covariance. For each group of grade levels, and for the entire group across grades, pretest NCE scores were used to perform covariance adjustments on post test NCE scores prior to testing their mean difference for statistical significance.

Having both pre and post measures for each student meant that gains for each student could be inspected to see whether differential gains were present for the two treatment groups. But gain scores, while intuitively appealing, have several psychometric drawbacks. Though they do indeed show the amount of gain experienced by each student, they are inherently rather unreliable, are subject to regression effects and ceiling effects of the instruments used, and do not reflect differential rates of learning which may characterize the groups prior to introduction of the treatments. Gain scores are reported for each group analyzed in an effort to achieve completeness of reporting, but the reader is cautioned concerning their over-interpretation.

A better way to compensate for initial diierences between the treatment groups is to develop residualized gain scores, i.e., post test scores which have been adjusted to take into account differences between the groups at pretest time. These altered post test scores can then be analyzed by means of analysis of variance. This approach is called analysis of covariance, and was the principal analytical tool used in this research.

IV. RESULTS

As in prior years, the research purpose of the program this year was to determine whether the addition of computer assisted instruction to an otherwise typical ESEA Title I program would produce incremental and statistically significant gains in achievement for those students who received the CAI treatment. The standardized achievement criterion used in the study was the Metropolitan Achievement Test series, as revised in 1978 (Metro 78).

DATA

Table 2 shows the numbers of children who participated in the program during the past year and for whom pre and post test data were analyzed. Though both raw scores and scaled scores were obtained for each student, pre and post, all analyses here reported were conducted using normal curve equivalent scores (NCE's). This was done in order that students could be grouped across grade levels to increase available N's for more meaningful analyses, and so that equal numbers of children at each grade level in both treatment groups would be unnecessary for meaningful analyses.

Tables 6 and 7 present results obtained in reading and mathematics by grade level group and across grade levels. Separate analyses were conducted for children in the City of Lawrence since its program is somewhat different from a scheduling standpoint, and several children were also participants in an "English as a Second Language" (ESL) program. Therefore, separate analyses are presented in Tables 8 and 9 for students in the Lawrence programs.

Analyses of pre to post gains are presented in Tables 10 through 12. The summary tables show the numbers of students in each treatment group, means, standard deviations and probabilities associated with significance tests performed upon NCE gain score means, or between post test means adjusted using pretest scores as covariates. For these latter analyses, only summaries are presented in the text. Complete results for each analysis of covariance are presented in Appendix A.

GROUPS ANALYZED

Results for reading were analyzed using four subgroups of grade levels: grade 2; grades 3 and 4; grades 5 and 6; and, grades 7, 8 and 9. Results for mathematics were analyzed in similar groups of grades: grades 1 and 2; grades 3 and 4; and, grades 5 and 6.

Table 6

Summary of Analyses of Covariance
By Grade Level Group

Reading

Grades	N's Exp	N's Comp	Means Pre Exp	Means Pre Comp	SD's Pre Exp	SD's Pre Comp	Pre-Test P	Unadjusted Means Post Exp	Unadjusted Means Post Comp	SD's Post Exp	SD's Post Comp	Adjusted Means Post Exp	Adjusted Means Post Comp	Post-Test P
2	50	70	38.35	38.57	14.49	13.14	.928	47.74	40.90	16.39	16.75	48.17	40.59	.008
3-4	82	99	36.15	38.68	11.00	10.56	.106	40.85	39.26	11.25	13.34	41.67	38.58	.051
5-6	40	63	35.92	37.63	12.52	12.40	.488	42.35	37.95	11.03	11.48	43.26	37.38	.002
7-9	70	35	34.18	38.41	12.39	12.81	.101	42.07	36.76	12.42	16.22	43.31	34.29	<.001
2-9 comb	242	267	36.59	38.59	12.69	12.36	.055	43.15	39.45	14.29	14.43	43.93	38.64	<.001

Table 7

Summary of Analyses of Covariance
By Grade Level Group

Mathematics

Grades	N's Exp	N's Comp	Means Pre Exp	Means Pre Comp	SD's Pre Exp	SD's Pre Comp	Pre-Test P	Unadjusted Means Post Exp	Unadjusted Means Post Comp	SD's Post Exp	SD's Post Comp	Adjusted Means Post Exp	Adjusted Means Post Comp	Post-Test P
1-2	39	81	39.87	43.10	14.45	16.35	2.73	57.32	52.00	18.24	18.49	58.33	51.52	.046
3-4	63	75	43.27	42.37	14.61	11.50	.674	48.13	47.63	14.82	12.93	48.06	47.70	.852
5-6	49	45	43.15	40.63	11.74	13.20	.316	45.85	44.05	10.95	13.04	45.21	44.75	.823
1-6 comb	151	201	42.37	42.30	13.73	13.97	.962	49.77	48.60	15.25	15.66	49.87	48.52	.366

Table 6

Summary of Analyses of Covariance
By Grade Level Group

for Lawrence Reading
Regular Title I Students

Grades	N's Exp	N's Comp	Means Pre Exp	Means Pre Comp	SD's Pre Exp	SD's Pre Comp	Pre-Test P	Unadjusted Means Post Exp	Unadjusted Means Post Comp	SD's Post Exp	SD's Post Comp	Adjusted Means Post Exp	Adjusted Means Post Comp	Post-Test P
2-4	78	74	26.68	34.00	13.72	11.20	.001	31.87	38.36	11.91	14.46	33.80	36.32	.173
5-6	51	53	27.17	22.69	13.67	11.00	.057	35.40	26.90	9.88	11.77	34.08	28.18	.003
2-6 comb	129	127	28.88	29.38	13.69	12.41	.108	33.27	33.58	11.24	14.57	33.71	33.13	.664

Table 9

Summary of Analyses of Covariance
By Grade Level Group

for Lawrence Language Arts
ESL Students

Grades	N's Exp	N's Comp	Means Pre Exp	Means Pre Comp	SD's Pre Exp	SD's Pre Comp	Pre-Test P	Unadjusted Means Post Exp	Unadjusted Means Post Comp	SD's Post Exp	SD's Post Comp	Adjusted Means Post Exp	Adjusted Means Post Comp	Post-Test P
4-6 comb	23	36	32.89	30.31	11.03	14.22	.380	42.24	32.85	7.08	12.37	41.87	33.08	.002

Table 10

Analysis of Gain Scores
by Grade Level Group

Reading

	N's		Mean NCE gain		SD's				
Grades	Exp.	Comp.	Exp.	Comp.	Exp.	Comp.	t	df	p
2	50	70	10.27	1.94	18.89	14.91	2.70	118	.008
3-4	82	99	4.66	.63	10.94	11.54	2.39	179	.018
5-6	40	63	6.84	- .28	12.42	9.47	3.29	101	.001
7-9	70	35	8.12	-1.64	9.65	8.36	5.10	103	<.001
2-9 comb	286	274	7.00	.72	13.68	12.30	5.70	558	<.001

Table 11

Analysis of Gain Scores
by Grade Level Group

Mathematics

	N's		Mean NCE gain		SD's				
Grades	Exp.	Comp.	Exp.	Comp.	Exp.	Comp.	t	df	p
1-2	39	81	17.94	8.98	21.05	18.77	2.35	118	.020
3-4	63	75	5.19	4.91	12.52	12.18	.13	136	.895
5-6	49	45	3.08	3.66	9.31	13.00	.25	92	.804
1-6 comb	151	201	7.80	6.27	15.55	15.43	.92	350	.360

Table 12

Analysis of Gain Scores
by Grade Level Group

Regular Title I Students: Reading

ESL Students: Language Arts

	N's		Mean NCE gain		SD's				
Grades	Exp.	Comp.	Exp.	Comp.	Exp.	Comp.	t	df	p
Regular Title I Students: Reading									
2-4	78	74	5.24	5.01	11.51	12.66	.12	150	.906
5-6	51	53	6.90	4.25	10.52	12.56	1.17	102	.246
2-6 comb	129	127	5.90	4.69	11.12	12.57	.81	254	.416
ESL Students: Language Arts									
4-6	23	36	10.90	3.35	13.53	13.02	2.14	57	.037

With only one exception (grades 2-4 in the Lawrence group) all comparisons made in reading showed statistically significant results which favored the CAI treatment groups. Most comparisons performed in mathematics were not statistically significant. However, students in the CAI group consistently showed greater NCE gains than did their conventionally instructed peers.

Students who participated in the ESL program in Lawrence showed a highly significant difference in Language Arts (the criterion for this group) which favored the CAI treatment group.

QUESTIONNAIRE DATA

In a effort to assess process outcomes of the program and as an aide to improving the program next year, two questionnaires were administered to various publics on whom the program impinges. One questionnaire was designed for professional and para-professional staff members who served the program. A second questionnaire was administered to parents of the children served by the program. Copies of both instruments appear in Appendix C. Complete results of administering the staff questionnaire appear in Appendix B, but since the questionnaire was quite lengthy, the results from administering it are here presented in summary form.

STAFF QUESTIONNAIRE RESULTS

A total of 92 staff members responded to the questionnaire sent to them this year. 23 CAI Title I teachers and aides responded and 67 regular classroom teachers and 8 administrators responded. Only the CAI Title I teachers and aides responded to the entire questionnaire. Administrators and regular classroom teachers were not required to respond to sections of the questionnaire about which they would not be expected to have direct knowledge. The questionnaire included questions concerning the following areas of program operation:

1. program planning and organization;
2. supervision and staff development;
3. program evaluation;
4. morale and communications;
5. instructional conditions and staff;
6. testing and background information;
7. parental involvement;
8. cognitive and affective changes in students; and,
9. CAI systems.

The use of NCE scores in all analyses made possible the analysis of scores from various grade levels together where students had not necessarily responded to the same level of the Metro 78. NCE scores also allowed an overall analysis to be performed for both reading and mathematics. In Tables 6 and 7 separate analyses are reported for each reading and mathematics group, and for all groups combined.

At the extreme right of each of these tables, the reader will find post test probabilities. These indicate whether the comparisons being made can be regarded as statistically significant. By convention, only probabilities of .05 or less are regarded as reflecting a difference which is probably not due to chance.

READING AND MATHEMATICS

For all grade level groups in reading, as is shown in Table 6, the CAI treatment was significantly more effective in producing achievement gains. Also, the mean NCE gain for CAI students was, in every case greater than was the corresponding gain for non-CAI students and was statistically significant as is shown in Table 10.

In mathematics, the impact of CAI was less dramatic, but was nevertheless consistent across all groupings of students. In each case, the NCE gains made by students in the CAI group were in excess of those observed for the non-CAI students. However, a significant difference in post test scores was noted only for mathematics students in grade level group 1 and 2.

Analyses conducted in both subject areas across all grade levels showed highly significant results for students in reading (Table 6) and statistically insignificant results for students in mathematics (Table 7). Note, however, that among mathematics students greater NCE gains were observed for CAI students than for their non-CAI counterparts.

PROGRAMS IN LAWRENCE

For students who were part of the Title I programs in the city of Lawrence, analyses were conducted across all grade levels, and for groups of grades (grades 2, 3 and 4; grades 5 and 6). With the exception of the grades 5-6 group, the differences in achievement for the two treatment groups were not statistically significant (see Tables 8 and 12). However, in general, the regular Title I students in Lawrence who were part of the CAI treatment group made slightly greater gains in their mean NCE scores pre to post than did their non-CAI peers. The grades 2 through 4 group is clearly an exception in that the mean NCE scores for the two treatment groups were significantly different at pretest time meaning that the "comparison" group was not, in fact, a legitimate comparison group in this analysis.

The city of Lawrence also supported an "English as a Second Language" program. Students in the program were formed into CAI and comparison groups as in the regular program, but the criterion variable of interest for the ESL children was the Metro 78 Language Arts scale, rather than the reading scale. Results of the analyses for the Lawrence ESL program are presented in Tables 9 and 12. Given the small numbers of students in the program as a whole and at each grade level, only one group was formed for analysis which included students in grades 4 through 6. As may be seen, the CAI students achieved significantly greater gains than did the conventionally instructed children.

STATISTICAL ANALYSES EMPLOYED

The principal analytical tool used in this research was analysis of covariance. In all analyses, normal curve equivalent scores (NCE's) were used in order that grade levels could be combined for analysis in a legitimate fashion. Analysis of covariance assumes that differences on the criterion measure administered as a pretest are not statistically significant. It is important to note that in only one case, the regular reading program in Lawrence grades 2 through 4, was this assumption not met. In all other analyses, the CAI and comparison groups which were formed began the program year at comparable levels in respect to their knowledge of reading. As a consequence of this, the reader may place considerable confidence in the results of the analyses of covariance which have been reported (with the exception just noted).

A pre to post NCE gain score was formed for each child as well in order that t-tests could be performed comparing the previously defined groups in terms of their NCE gains. While an intuitively more satisfying method of analysis, performing a t-test of gain scores is somewhat less legitimate than using analysis of covariance when the latter's assumptions have been met or approximated. The t-tests of NCE gains scores have been performed and are reported in the interests of completeness.

SUMMARY OF ACHIEVEMENT TESTING RESULTS

The previously described analyses were performed to determine whether the introduction of CAI as a part of the regular Title I program would produce achievement gains in excess of those to be expected without CAI.

1. Program Planning and Organization

Nearly all respondents to the questionnaire expressed the feeling again this year that the program was well planned and organized, that the curriculum emphases were proper, that the objectives of the program were clear to them, appropriate, and directly related to the objectives which the program was attempting to achieve. They also felt that the instructional activities which were employed were directly related to program objectives. Also, staff development efforts this past year were regarded as adequate and effective.

2. Supervision and Staff Development

Respondents indicated that their program director was interested in the CAI program and was responsive to staff and student needs. As previously noted, respondents felt that the efforts of the past year with regard to staff development seemed to be appropriate.

3. Program Evaluation

Virtually all those responding felt that the students whom the program serves and who were involved with CAI liked it. They also felt that their students had developed improved attitudes toward school and learning over the year, were better able to succeed in school as a result of having participated in the program, and had made substantial progress over the year in areas in which they had been weak academically.

4. Morale and Communications

Apparently, difficulties which had arisen in the areas of morale and communication at times in the past have largely been overcome. Respondents to this year's questionnaire indicated that the morale of CAI Title I teachers was high and that good communication existed between them and staff at the Merrimack Education Center. This was due largely to the efforts of a full time professional coordinator at MEC during the past year. However, some comments were noted which indicate that communication links between regular classroom teachers and the Title I CAI staff could be improved.

5. Instructional Conditions and Staff

Virtually all respondents agreed this year that the CAI teachers were well prepared, that student contact time with the CAI system was appropriate and that the instruction provided students in the program was excellent. Student attendance was also regarded as good. The areas set aside for instruction in some cases were seen as having drawbacks, but all were seen as adequate means by which program goals could be achieved.

Some teachers continue to feel that the length of their tutorial or small group sessions is not adequate for them to achieve what they would like to achieve with their children. Also, some teachers felt that children were sometimes assigned to Title I programs when their problems lay more in special education areas. However, most respondents did not note these problems and in any event, the number of adverse comments noted was substantially less this year than last.

6. Testing and Background Information

Respondents were impressed with the computer system's initial placement motion procedures which serve to identify the entry level of each student at each strand within the curriculum. They also felt that the diagnostics and progress reports which the system generates for students and groups of students were very useful and that student records were easily accessible to them throughout the program year.

In general, the standardized testing procedures employed in this year's program were viewed as adequate. There was general agreement that the screening procedures were appropriate and that administration of the achievement instruments was more properly conducted this year than last.

With some dissention, it appeared that testing procedures were appropriate and effective.

7. Parental Involvement

The overwhelming majority of the respondents stated that parents were enthusiastic about the program this past year, that their children were enthusiastic participants in the program, and that as a result of their participation in the program the children were doing better in school.

Avenues by which parents can interact with the program and its staff appear to have been broadened and increased in number to the point where most respondents felt them to be adequate.

8. Cognitive and Affective Changes in Students

In each of 14 areas, CAI teachers were asked to sort their students into five groups according to the amount and direction of change each child had shown over the course of the year's program operation. Some of the areas had to do with achievement (reading vocabulary, arithmetic computation, etc.), others had to do with social and emotional aspects of the program (personal security, self-image, self-confidence, etc.). Nearly all students were rated by their teachers as having experienced positive changes in achievement and at least moderate changes in the social and emotional areas which are important in school. Only a small fraction of the children were rated as having lost ground in these areas during the program year.

9. CAI Systems

Most sites received very reliable service from the computer equipment located there and from the central computer located at the Merrimack Education Center. Breakdowns did occur, of course, but not on the scale which had characterized previous years. When breakdowns did occur, service was generally seen as being prompt and effective.

Again this year, the CAI presentation devices were seen as being easy to use by students and teachers and as highly reliable. The curriculum materials contained in the computer system's library and presented to children in the CAI groups were regarded as proper in their scope and sequence. The average rating of the curriculum materials used in the program was near to excellent.

PARENT QUESTIONNAIRE

A separate questionnaire was constructed to be administered to parents of children whom the program served in the year past. 201 Parents responded to the questionnaire this year. Table 13 lists the questions contained in the questionnaire together with the percentage of parents responding in each category.

Parents were generally aware of the CAI program and indicated that they were familiar with its purposes. The majority of respondents indicated again this year that their child enjoyed the program and was benefitting from participating in it. They also indicated that they hoped their child would be selected to continue in the program in the coming year.

Table 13

Results of Parent Survey Questionnaire

N=201

Question	% Yes	% No
1. Did you know that a Computer Assisted Instruction (CAI) Title I program was in operation in your school system?	100	0
2. Did you know that your child was involved in the CAI Title I program in your community?	98	2
3. Have you been made aware of the general purpose of the CAI Title I program in which your child is receiving help?	80	5
4. Do you feel familiar with what the computer assisted instruction (CAI) program in Title I can do and/or is doing for your child?	88	0
5. Do you receive information (newsletters, newspapers, announcements) regarding CAI activities in your school or community?	70	30
6. Have you been invited to visit CAI Title I classes, in which your child is enrolled, to see the program in operation?	81	16
7. Have you been able to discuss with teachers, often enough, the progress your child is making?	58	33
8. Have you been receiving periodic information (either orally or in writing) from the Title I teacher(s) on how well your child is progressing in this CAI program?	63	20
9. Does your child enjoy working with the CAI Title I teacher(s)?	98	0
10. Does your child talk about CAI Title I classes at home?	75	22
11. Does your child seem to enjoy school more since the beginning of the CAI Title I program?	80	7
12. Do you feel your child is receiving academic benefits from Title I services?	81	6
13. Do you see any positive indication that your child is improving in his/her general school work since starting the CAI program?	75	13
14. Is the CAI Title I program helping your child as much as you thought it would?	82	6
15. Do you feel your child will be better able to succeed in school next year, as a result of attending CAI Title I classes this year?	72	14
16. Do you feel that the computer assisted instruction component of Title I should be continued next year?	87	14
17. Do you see any major improvements that could be made in the CAI Title I program in your community?	19	67

V. DISCUSSION

The principal question to be answered in this research was whether the introduction of computer assisted instruction as a part of Title I programs in reading and/or mathematics would produce incremental and statistically significant achievement gains over and above those which would be expected from regular Title I programs alone. To determine whether the principal objective set for the program had been achieved, a pretest, post test quasi-experimental research design was employed which compared achievement gains made by students who received "conventional" Title I instruction with those gains made by students who, as part of their Title I instruction, interacted with the CAI system. The principal analytical tool used was analysis of covariance, though analyses of gain scores were performed as well. All analyses reported were conducted using normal curve equivalent scores (NCE's).

The year for which this report is being written was the third year in which the program has been in operation. In its first year of operation, the program encountered numerous problems which resulted in the treatments being applied only for a small fraction of the school year. These problems made it difficult to determine whether the CAI treatment had had any measurable effect on the learning of the children involved in Title I in the participating communities. As a consequence, the first year of program operation was, in effect, declared to have been a "start-up" year.

In the second year of the program's operation, some problems were encountered with respect to research design compliance, but the problems with equipment, noted in the previous year, had been largely overcome. In that year it was found that the CAI treatment was superior to the non-CAI treatment for students in mathematics as reflected by highly significant differences favoring the CAI treatment. For students in reading, it appeared to be the case that the CAI treatment was moderately effective in the lower elementary grades relative to the non-CAI treatment, but that a reversal of effects occurred in the junior high and high school levels.

This year, there has been very good design compliance which has resulted in rather uniform results with respect to achievement in reading, mathematics and language arts. The following conclusions appear to be warranted, based upon the results obtained:

1. With only one exception, the children who received the CAI treatment achieved greater NCE gains than did their counterparts wno did not receive the CAI treatment. In reading, the gains were all statistically significant and quite sizeable. In mathematics the gains were all in favor of the CAI treatment, but in most cases were not statistically significant. What is important to note in this year's results is their uniformity. That is to say, the fact that the results showed the CAI treatment to be superior to the conventional approach in nearly every case (though not always to a statistically significant degree).

2. The uniform results alluded to are doubtless due to the fact that for the first time the program has managed to adhere in large degree to the research design proposed for it. Children were tested in the Fall and Spring at the times designated by the test publishers. Also, they were all tested using the appropriate level and form of the achievement tests used as criteria, i.e., no off-level testing occurred.

3. The logs maintained at each learning site attest to the increased design compliance. They show, among other things, that the system was in operation a reasonable portion of the time; that students who were supposed to interact with the system did so largely as planned; and, that the programs at each site (whether CAI or non-CAI) met as had been proposed.

VI. RECOMMENDATIONS

In future years of the program's operation, the following suggestions are offered as guides to strengthen and broaden program activities:

1. Efforts to maintain design compliance should be continued. Results obtained in the current year were generally uniform, though not in every case statistically significant. The uniformity of results is due most likely to the fact that for the first time, design compliance has been rather good.

   Continued positive findings in next year's program, assuming that it is essentially the same program which has been in operation during the current year, would suggest further that the CAI treatment does, indeed, have the effects which its proponents have suggested so vigorously. Therefore, staff who influence the manner in which the program is executed, and its content are urged to continue to strengthen the program as it is currently rather than attempt to introduce new variables in the coming year.

2. The design used in evaluating this project has proven to be adequate. It is recommended that any replication of this project in new settings utilize this, or a similar design.

3. By the end of the next program year, a sizeable group of children ought to have been formed who have experienced the CAI treatment over a three year period. At that time, it would make sense to attempt to assess the longitudinal effects of exposure to CAI by whatever means appear to be feasible.

4. By the end of next year, sufficient data should also be available to attempt an assessment of the adequacy of the internal scoring system used by the computer system in relation to the Metro 78. If it could be shown that the two measuring systems are roughly equal in the manner in which they describe children who have interacted with the system, then, perhaps the internal scoring system would be sufficient by itself to answer many research and evaluation questions.

5. Given the fact that reduction in force at the district level has produced teacher turn-over in Title I projects, renewed and continued commitment to in-service staff development programs is recommended.

6. As far as program operation is concerned, only one area appears to need attention in the coming year. Regular classroom teachers and Title I teachers feel that there is not enough time available to them to communicate concerning the children who are their joint responsibilities. This has been a perennial problem, but should now be solved in any manner feasible.

7. Sufficient data exists to warrant the Title I CAI Project application for validation at the State level and/or the Federal Review by J.D.R.P. (Joint Dissemination Review Panel).

APPENDIX A

Analysis of Covariance by Design Model and Grade Level

TABLE A1

Analysis of Covariance

Reading Group 1

Grade 2

Source	Reading SS	DF	MS	F	P
Covariate	5192.680	1	5192.680	22.423	<.001
Main Effects	1670.965	1	1670.965	7.216	.008
Explained	6863.645	2	3431.822	14.819	<.001
Residual	27094.344	117	231.576		
TOTAL	33957.988	119	285.361		

Deviations from Grand Mean

Grand Mean = 43.75		N	Unadjusted	Adjusted
Reading	CAI Students	50	3.99	4.42
	Comparison Students	70	-2.85	-3.16
	Total	120		

TABLE A 2

Analysis of Covariance

Reading Group 2

Grades 3 - 4

Source	Reading SS	DF	MS	F	P
Covariate	7855.395	1	7855.395	71.305	<.001
Main Effects	424.457	1	424.457	3.853	.051
Explained	8279.852	2	4139.926	37.579	<.001
Residual	19609.504	178	110.166		
TOTAL	27889.355	180	156.941		

Deviations from Grand Mean

Grand Mean = 39.98		N	Unadjusted	Adjusted
Reading	CAI Students	82	0.87	1.69
	Comparison Students	99	-0.72	-1.40
	Total	181		

TABLE A3

Analysis of Covariance

Reading Group 3

Grades 5 - 6
(excluding Dracut)

Source	Reading SS	DF	MS	F	P
Covariate	4052.716	1	4052.716	47.680	<.001
Main Effects	836.050	1	836.050	9.836	.002
Explained	4888.766	2	2444.383	28.758	<.001
Residual	8499.805	100	84.998		
TOTAL	13388.570	102	131.260		

Deviations from Grand Mean

Grand Mean = 39.66		N	Unadjusted	Adjusted
Reading	CAI Students	40	2.69	3.60
	Comparison Students	63	-1.71	-2.28
	Total	103		

TABLE A 4

Analysis of Covariance

Reading Group 4

Grades 7,8,9
and 6th Grade Dracut

Source	Reading SS	DF	MS	F	P
Covariate	10161.578	1	10161.578	124.145	<.001
Main Effects	1844.238	1	1844.238	22.531	<.001
Explained	12005.816	2	6002.906	73.338	<.001
Residual	8348.934	102	81.852		
TOTAL	20354.750	104	195.719		

Deviations from Grand Mean

Grand Mean = 40.30		N	Unadjusted	Adjusted
Reading	CAI Students	70	1.77	3.01
	Comparison Students	35	-3.54	-6.01
	Total	105		

TABLE A 5

Analysis of Covariance

Total Reading Group

Grades 2 - 9

Source	Reading SS	DF	MS	F	P
Covariate	31171.164	1	31171.164	211.541	$<.001$
Main Effects	3881.781	1	3881.781	26.343	.001
Explained	35053.000	2	17526.500	118.943	$<.001$
Residual	82075.375	557	147.353		
TOTAL	117128.375	559	209.532		

Deviations from Grand Mean

Grand Mean = 41.34		N	Unadjusted	Adjusted
Reading	CAI Students	286	1.81	2.59
	Comparison Students	274	-1.89	-2.70
	Total	560		

TABLE A 6

Analysis of Covariance

Mathematics Group 1

Grades 1 - 2

Source	Mathematics SS	DF	MS	F	P
Covariate	4496.766	1	4496.766	15.142	<.001
Main Effects	1207.105	1	1207.105	4.065	.046
Explained	5703.871	2	2851.936	9.603	<.001
Residual	34746.676	117	296.980		
TOTAL	40450.547	119	339.920		

Deviations from Grand Mean

Grand Mean = 53.73		N	Unadjusted	Adjusted
Mathematics	CAI Students	39	3.59	4.60
	Comparison Students	81	-1.73	-2.21
	Total	120		

TABLE A 7

Analysis of Covariance

Mathematics Group 2

Grades 3 - 4

Source	Mathematics SS	DF	MS	F	P
Covariate	8735.082	1	8735.082	68.004	<.001
Main Effects	4.465	1	4.465	0.035	.852
Explained	8739.547	2	4369.773	34.019	<.001
Residual	17340.750	135	128.450		
TOTAL	26080.297	137	190.367		

Deviations from Grand Mean

Grand Mean = 47.86		N	Unadjusted	Adjusted
Mathematics	CAI Students	63	0.27	0.20
	Comparison Students	75	-0.23	-0.16
	Total	138		

TABLE A8

Analysis of Covariance

Mathematics Group 3

Grades 5 - 6

Source	Mathematics SS	DF	MS	F	P
Covariate	4749.621	1	4749.621	48.990	<.001
Main Effects	4.902	1	4.902	0.051	.823
Explained	4754.523	2	2377.262	24.523	<.001
Residual	8822.590	91	96.952		
TOTAL	13577.113	93	145.990		

Deviations from Grand Mean

Grand Mean = 44.99		N	Unadjusted	Adjusted
Mathematics	CAI Students	49	0.86	0.22
	Comparison Students	45	-0.94	-0.24
	Total	94		

TABLE A 9

Analysis of Covariance

Total Mathematics Group

Grades 2 - 6

Source	Mathematics SS	DF	MS	F	P
Covariate	17111.902	1	1711.902	88.858	.001
Main Effects	157.910	1	157.910	0.820	.366
Explained	17269.813	2	8634.906	44.839	.001
Residual	67209.063	349	192.576		
TOTAL	84478.875	351	240.681		

Deviations from Grand Mean

Grand Mean = 49.10		N	Unadjusted	Adjusted
Mathematics	CAI Students	151	0.67	0.77
	Comparison Students	201	-0.50	-0.58
	Total	352		

TABLE A 10

Analysis of Covariance

Lawrence Regular Program
Reading Group 1

Grades 2,3,4

Source	Reading SS	DF	MS	F	P
Covariate	9672.375	1	9672.375	80.516	<.001
Main Effects	224.957	1	224.957	1.873	.173
Explained	9897.332	2	4948.664	41.194	<.001
Residual	17899.281	149	120.129		
TOTAL	27796.613	151	184.084		

Deviations from Grand Mean

Grand Mean = 35.03		N	Unadjusted	Adjusted
Reading	CAI Students	78	-3.16	-1.23
	Comparison Students	74	3.33	1.29
	Total	152		

TABLE A11

Analysis of Covariance

Lawrence Regular Program
Reading Group 2

Grades 5 - 6

Source	Reading SS	DF	MS	F	P
Covariate	3898.494	1	3898.494	42.346	<.001
Main Effects	852.045	1	852.045	9.255	.003
Explained	4750.539	2	2375.270	25.801	<.001
Residual	9298.285	101	92.062		
TOTAL	14048.824	103	136.396		

Deviations from Grand Mean

Grand Mean = 31.07		N	Unadjusted	Adjusted
Reading	CAI Students	51	4.33	3.01
	Comparison Students	53	-4.17	-2.89
	Total	104		

TABLE A12

Analysis of Covariance

Lawrence Regular Program
Total Reading Group

Grades 2 - 6

Source	Reading SS	DF	MS	F	P
Covariate	14294.293	1	14294.293	126.902	$<.001$
Main Effects	21.289	1	21.289	0.189	.664
Explained	14315.582	2	7157.789	63.545	$<.001$
Residual	28498.027	253	112.640		
TOTAL	42813.609	255	167.896		

Deviations from Grand Mean

Grand Mean = 33.42		N	Unadjusted	Adjusted
Reading	CAI Students	129	-0.15	0.29
	Comparison Students	127	0.16	-0.29
	Total	256		

TABLE A13

Analysis of Covariance

Lawrence ESL Program

Grades 4,5,6
(grade 3 out - no CAI's)

Source	Language Arts SS	DF	MS	F	P
Covariate	1221.142	1	1221.142	12.562	.001
Main Effects	1079.365	1	1079.365	11.104	.002
Explained	2300.508	2	1150.254	11.833	L.001
Residual	5443.574	56	97.207		
TOTAL	7744.082	58	133.519		

Deviations from Grand Mean

Grand Mean = 36.51		N	Unadjusted	Adjusted
Language Arts	CAI Students	23	5.73	5.36
	Comparison Students	36	-3.66	-3.43
	Total	59		

APPENDIX B

Summary of Responses to Staff Questionnaire

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
	Agr	Dis	Agr	Dis	Agr	Dis
PROGRAM PLANNING AND ORGANIZATION:						
1. The CAI program was well planned and organized	95	0	100	0	95	0
2. The curriculum emphasis of the CAI program was correct	95	0	100	0	90	0
3. The objectives of the CAI program were clear to me	90	0	95	5	80	5
4. The CAI program's objectives were appropriate	90	0	100	0	80	0
5. Instructional activities were directly related to these objectives	85	5	95	0	80	0
6. The CAI program's objectives and its operation were flexible enough to allow for sufficient change as needed	85	5	98	0	85	5
7. The pre-service orientation and training program for teachers and teacher aides was adequate	90	0	100	0	50	5
8. The in-service meetings have been effective in providing information, techniques and materials	95	5	95	5	25	5
9. I have attended a pre-service meeting	80	5	20	80	5	85
10. I have attended in-service meetings	85	5	20	80	5	85
11. Regular classroom teachers understand the objectives of the CAI Title I program	90	10	100	0	80	15
12. Regular classroom teachers are enthusiastic about the CAI Title I program	85	5	95	5	80	10

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
	Agr	Dis	Agr	Dis	Agr	Dis
SUPERVISION AND STAFF DEVELOPMENT						
1. The program director is interested in CAI Title I activities	90	5	95	5	90	0
2. The program director is responsive to the needs of CAI Title I students and personnel	90	0	100	0	80	0
3. Supervisors and specialists in the school system have been helpful to CAI Title I teachers	85	5	100	0	85	5
4. There should be more meetings between the Title I Director and CAI Title I staff	20	70	5	30	25	5
5. More preparation of CAI staff at the outset of the CAI Title I program is advisable	15	60	25	75	15	0
6. Sufficient information regarding expectations, procedures and goals was presented to the CAI Title I staff prior to beginning CAI program operations	75	0	100	0	20	0
7. The Merrimack Education Center has offered an effective in-service program for CAI Title I teachers this year	85	5	95	5	10	0
8. The enthusiasm and support of the building principal is a definite asset to the CAI program in my school	80	10	95	0	40	0
9. I would like the opportunity to observe the instruction of CAI Title teachers and aides in another building or community	65	15	20	25	20	20
10. I am visited by the CAI Title I administrators often enough for them to understand what I am doing	85	5	100	0	30	15

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
PROGRAM EVALUATION	Agr	Dis	Agr	Dis	Agr	Dis
1. Students involved in the CAI Title I program liked it	95	0	100	0	90	0
2. I noticed a definite improvement in the attitudes of Title I students toward school and learning in general over the course of the program this year	95	5	95	5	90	10
3. The students who participated in the program this year are better able to succeed in school as a result of the program	90	5	100	0	80	5
4. CAI Title I students in my classes have made substantial progress in their areas of weakness	95	0	100	0	85	15
5. The evaluation of the CAI program did not interfere with the instructional process	90	5	100	0	50	10
MORALE AND COMMUNICATIONS						
1. The morale of CAI Title I teachers has been good	85	5	100	0	80	5
2. I am satisfied with both the frequency and type of formal periodic progress reports provided regular classroom teachers	80	5	95	5	20	10
3. Effective communications exist between CAI Title I teachers and regular classroom teachers	25	15	100	0	75	10

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

MORALE AND COMMUNICATIONS cont.	CAI Title I Teachers % Agr	CAI Title I Teachers % Dis	Administrators % Agr	Administrators % Dis	Regular Teachers % Agr	Regular Teachers % Dis
4. CAI Title I staff in our school understand the role of Title I (Federal Guidelines, etc.)	95	0	100	0	85	5
5. Sufficient information regarding expectations, procedures and goals of the current CAI Title I program was presented to Title I instructional staff at the beginning of the program	90	5	100	0	65	5
6. Communication among CAI Title I teachers from the various schools was adequate to achieve program objectives	90	5	30	0	20	5
7. Communication among CAI Title I teachers and regular classroom teachers was adequate to achieve program objectives	80	10	100	0	50	5
8. Communication between CAI Title I teachers and Title I parents was adequate to achieve program objectives	70	15	80	0	25	5
9. Communication between CAI Title I staff and the Merrimack Education Center was adequate to achieve program objectives	90	5	100	0	20	0
10. There is not enough coordination of effort between the CAI Title I program and the regular classroom program	20	80	5	95	15	65
11. The program director has a good working relationship with regular school system administrators (e.g., principals).	90	0	100	0	45	5

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
	Agr	Dis	Agr	Dis	Agr	Dis
INSTRUCTIONAL CONDITIONS AND STAFF						
1. The scheduling of CAI Title I classes was satisfactory	60	20	75	0	75	5
2. The length of tutorial or small group periods (e.g., 20 minutes) in the CAI program was adequate	70	10	80	0	75	5
3. Student daily contact time with the computer (e.g., 10 minutes) was about right	90	10	80	0	25	5
4. CAI Title I children do not miss much regular classroom work	90	5	85	0	45	10
5. The CAI Title I teachers were well prepared.	95	0	75	0	85	5
6. Instruction provided by CAI Title I teachers was excellent	90	5	80	0	90	5
7. Students have sometimes been assigned to the CAI Title I class for remedial help (e.g., reading) when their fundamental problems appeardd to be in other areas (e.g., learning disability; limited English speaking ability, emotional problems).	40	40	50	25	30	35
8. The physical characteristics of CAI instructional areas were appropriate to achieve the programs objectives	90	10	80	0	65	25
9. Title I classes take priority over most other activities in my school so that my students receive a full period of instruction daily	70	25	80	0	70	10
10. Most of the students enrolled in CAI Title I classes attend regularly	95	5	75	5	90	5

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
	Agr	Dis	Agr	Dis	Agr	Dis
INSTRUCTIONAL CONDITIONS AND STAFF cont.						
11. Sufficient quantities of manuals and other materials for the CAI system were available for my use in the program	95	5	55	20	70	20
TESTING AND BACKGROUND INFORMATION						
1. Student screening and placement procedures were satisfactory	85	5	80	0	80	5
2. The standardized tests used in the CAI program were appropriate	85	5	30	25	75	5
3. Sufficient diagnostic testing information was provided CAI Title I teachers on each child	90	10	80	0	95	5
4. Student records (cumulative folders, report cards, etc.) were easily accessible to CAI Title I teachers throughout the program	95	0	75	0	95	0
5. "Grade level" placement of each child by the computer system was appropriate	90	5	75	0	25	5
6. CAI system generated student reports were useful to teachers	90	5	80	0	40	10
PARENTAL INVOLVEMENT						
1. There is sufficient parental involvement in the program	80	20	80	5	45	10
2. I have had the opportunity to meet with a large percentage of CAI Title I parents throughout the program	70	15	75	0	45	15
3. The CAI Title I program has been effective in fostering positive attitudinal changes in parents	80	15	80	0	30	5

SUMMARY OF RESPONSES TO STAFF QUESTIONNAIRE

	CAI Title I Teachers %		Administrators %		Regular Teachers %	
	Agr	Dis	Agr	Dis	Agr	Dis
PARENTAL INVOLVEMENT cont.						
4. Parents receive sufficient information about their children's progress in the CAI Title I program	80	15	75	0	25	5
5. CAI Title I parents are enthusiastic about the program	90	0	80	0	90	5
6. Parents indicated that their children enjoyed participating in the CAI Title I program	85	5	75	0	90	5
7. Parents feel that their children are doing better in school as a result of the CAI program	90	5	85	0	95	0

COGNITIVE AND AFFECTIVE CHANGES IN STUDENTS

For each row, fill in the number of your students who showed each degree of cognitive or affective change during this year's CAI Title I program.

N's Converted to Percentages

	% Highly Positive	% Moderately Positive	% No Change	% Moderately Negative	% Highly Negative
1. personal security	30	40	25	2	0
2. self-image	45	35	10	2	0
3. self-confidence	50	45	3	2	0
4. self-control	50	48	1	1	0
5. work habits	38	52	7	1	0
6. attitude toward school	40	51	9	3	0
7. responsibility for property	40	45	15	2	0
8. classroom behavior	35	48	10	0	0
9. reading vocabulary	40	50	10	0	0
10. reading comprehension	45	50	8	0	0
11. oral reading	25	51	20	1	0
12. word attack skills	37	49	7	0	0
13. arithmetic computation	45	45	18	0	0
14. arithmetic problem solving	40	39	22	2	0

CAI SYSTEMS

	% YES	% NO
1. Once your system became operational, has it broken down in the past year?	95	0

2. If breakdowns occurred, how many times did they occur in each of the following areas:	% Of Breakdowns
a. student display unit	25
b. printer unit ("join" problems or simply unit malfunction)	20
c. local processor (the big box to which all other local equipment is connected)	15
d. telephone line connections to the central processor at the Merrimack Education Center	25
e. central processor at the Merrimack Education Center	18
f. some combination of the above not clearly discernable	0

	% YES	% NO
3. When breakdowns occurred,		
a. was service readily available?	80	5
b. to what extent did service correct the problem?		
Temporarily	5	0
More or less permanently	90	0

4. Please comment briefly on the reliability of your CAI equipment.

_____

_____

_____

5. Since your system became operational, what percent of the time would you say that it remained operational during this year's program? 85-95%

7. How do you rate the CAI presentation devices?

	Median Response Category					
a. ease of use by students	High	X				Low
b. ease of use by teacher	High	X				Low
c. clarity of letters, numbers, etc., presented on screen	High		X			Low
d. reliability as machines	High		X			Low

8. How do you rate the CAI instructional sequences (the problems, passages, tasks) presented by the system?

a. clarity of presentation	Clear	X					Unclear
b. length of segments presented . .	Too Short			X			Too Long
c. motivational value of segments presented	Interesting		X				Dull
d. relevance to curriculum of segments presented	Relevant			X			Irrelevant
e. sequence of segments presented . . .	Clear		X				Jumbled
f. scope of segments presented . . .	Adequate			X			Inadequate
g. speed of presentation	Too Fast			X			Too Slow

9. All things considered, how do you rate the CAI instructional materials? . . . . . Poor ___ ___ ___ X ___ Excellent

11. Since your CAI installation became operational, what has been the average number of minutes per week each student has interacted with the CAI system?

$\bar{X}$ = 45.2
S = 6.20 avg. mins./wk.
R = 40-50

12. Since your CAI installation became operational, how many times per week has an average student been in contact with the CAI system?

3-5 times

13. On what date (approximately) did your CAI system become operational?

Since program began 80%
After program began 20%

APPENDIX C

Summary of Comments to Parent and Teacher Questionnaires

APPENDIX

Typical Positive Comments From Teachers

1. The computers give the children great incentive to work towards high scores.

2. The program is excellent. The children love participating. They enjoy the computer, and they think the teacher is super.

3. I would like to see more children benefit from using the computers.

4. It is good for the accelerated pupil and gives confidence to the slower child (proving he can do things on his own).

5. Helps to reinforce what the classroom teacher is teaching.

6. The tailored curriculum and the immediacy of right and wrong answers are strengths.

7. Strengthens independent learning styles and self-discipline.

8. Makes children think quickly -- more able to do head-work. Good exposure to a new teaching tool.

9. Children can't wait to go to Title I -- they enjoy working on the computers.

10. Great experience for kids and for me as their teacher! I loved it!

11. Individualization is unique and not able to be duplicated by the teacher.

12. Give the CAI Title I program "tenure".

Typical Comments From Parents

1. This program is great, it should be kept in the schools, it's a big help to the children.

2. Have the program available to more grades, not just a few.

3. If children could be involved at a later date especially for reading it would be beneficial in establishing better study habits.

4. My child has enjoyed being in this program, and I feel it has given her a new sense of achievement.

5. I have no comments except it has helped a great deal and thank you so much for your constant help, keep it up!

6. Ella esta progressando mejor.

7. I feel the computers should be expanded so more children have access to them. (That all schools should have them). If the schools had them earlier, our oldest boy would have been much better off. I feel very sure of that.

Suggestions From Teachers for Program Change

1. There is a definite lack of communication between the Title I teachers and regular classroom teachers.

2. I'd have someone from MEC come to the schools and talk with the regular classroom teachers to tell them what the computers are all about.

3. Time for communication with classroom teachers is a weakness.

4. Needs a more elementary reading program with word attack skills.

5. Would like some thinking games on each grade level to be used for variety.

6. Reading levels should be lowered to accommodate youngsters with ability below 2.5 grade level.

7. Some children have to leave the classroom at inconvenient times because of tight scheduling -- but this really can't be helped.

8. I believe there should be another reading course to be offered between RC and CRS. Perhaps RC might be extended further, since many students are still not capable of handling the CRS curriculum. I also feel that the paragraphs in RC should be made more interesting, with more human interest stories. The content of the paragraphs tend to be dry. Another criticism I have of RC is the use of odd names. Many of the students get distracted by them. There is one section using the names Bobo and Dink -- our students are greatly distracted by these names.

9. A student can be accidentally dropped from a course easily, and all records on the student in that course can be lost. I believe there should be a fail safe system which would prevent accidental loss of a student's records.

10. Make changes in the "names" used throughout the programs. Students do not seem familiar with a large percentage of names used. For example, "Beatrice", "Camilee", etc.

11. Have more conference time between CAI teachers and regular classroom teachers.

12. I'd be happy with one change! Please provide conference time at least once a month between CAI teachers and regular classroom teachers. We have no time for communication with regard to students' progress or lack thereof.

APPENDIX D

Questionnaires Used in the Study

C A I

COMPUTER ASSISTED INSTRUCTION PROGRAM

TITLE I

STAFF QUESTIONNAIRE

This questionnaire seeks staff opinions in a number of areas related to the Computer Assisted Instruction (CAI) Title I program conducted in your school during the past school year. Although the questionnaire is somewhat lengthy, it is essential to evaluators, and to Title I administrators, that your opinion is registered on each of the issues pertaining to the overall program. Your assistance in this regard will help further develop the Title I Project of which you are a part. Please note that your responses should be with respect to your CAI Title I program, not your entire Title I program.

Within 10 days, please return your completed questionnaire in the attached self-addressed envelope.

Please indicate your position:

*CAI Title I teacher ____ *CAI Title I Aide ____

Principal ____ Regular Classroom Teacher serving children in the CAI Title I program ____

*CAI teachers and aides should indicate (✓) their program(s) and grade level(s)

Reading only _____
Math only _____
Reading and Math _____

K _____	5 _____	9 _____
1 _____	6 _____	10 _____
2 _____	7 _____	11 _____
3 _____	8 _____	12 _____
4 _____		

Respond to each of the following items by circling ONE of the choices to the right of the item according to the following:

SA = strongly agree
A = agree
? = uncertain
D = disagree
SD = strongly disagree
NA = not applicable (you feel that this item is NOT relevant to your particular job or you do NOT feel qualified to render an opinion.)

Please add any personal comments concerning the item in the space provided on the right.

PROGRAM PLANNING AND ORGANIZATION							COMMENTS
1. The CAI program was well planned and organized	SA	A	?	D	SD	NA	
2. The curriculum emphasis of the CAI program was correct	SA	A	?	D	SD	NA	
3. The objectives of the CAI program were clear to me	SA	A	?	D	SD	NA	
4. The CAI program's objectives were appropriate	SA	A	?	D	SD	NA	
5. Instructional activities were directly related to these objectives	SA	A	?	D	SD	NA	
6. The CAI program's objectives and its operation were flexible enough to allow for sufficient change as needed	SA	A	?	D	SD	NA	
7. The pre-service orientation and training program for teachers and teacher aides was adequate	SA	A	?	D	SD	NA	
8. The in-service meetings have been effective in providing information, techniques and materials	SA	A	?	D	SD	NA	
9. I have attended a pre-service meeting			Yes		No		
10. I have attended in-service meetings			Yes		No		

COMMENTS

11. Regular classroom teachers understand the objectives of the CAI Title I program SA A ? D SD NA

12. Regular classroom teachers are enthusiastic about the CAI Title I program SA A ? D SD NA

SUPERVISION AND STAFF DEVELOPMENT

1. The program director is interested in CAI Title I activities SA A ? D SD NA

2. The program director is responsive to the needs of CAI Title I students and personnel. SA A ? D SD NA

3. Supervisors and specialists in the school system have been helpful to CAI Title I teachers. SA A ? D SD NA

4. There should be more meetings between the Title I Director and CAI Title I staff. SA A ? D SD NA

5. More preparation of CAI staff at the outset of the CAI Title I program is advisable. SA A ? D SD NA

6. Sufficient information regarding expectations, procedures and goals was presented to the CAI Title I staff prior to beginning CAI program operations. SA A ? D SD NA

7. The Merrimack Education Center has offered an effective in-service program for CAI Title I teachers this year. SA A ? D SD NA

8. The enthusiasm and support of the building principal is a definite asset to the CAI program in my school. SA A ? D SD NA

COMMENTS

9. I would like the opportunity to observe the instruction of CAI Title I teachers and aides in another building or community. SA A ? D SD NA

10. I am visited by the CAI Title I administrators often enough for them to understand what I am doing. SA A ? D SD NA

PROGRAM EVALUATION

1. Students involved in the CAI Title I program liked it. SA A ? D SD NA

2. I noticed a definite improvement in the attitudes of Title I students toward school and learning in general over the course of the program this year. SA A ? D SD NA

3. The students who participated in the program this year are better able to succeed in school as a result of the program. SA A ? D SD NA

4. CAI Title I students in my classes have made substantial progress in their areas of weakness. SA A ? D SD NA

5. The evaluation of the CAI program did not interfere with the instructional process. SA A ? D SD NA

MORALE AND COMMUNICATIONS

1. The morale of CAI Title I teachers has been good. SA A ? D SD NA

2. I am satisfied with both the frequency and type of formal periodic progress reports provided regular classroom teachers. SA A ? D SD NA

COMMENTS

3. Effective communications exist between CAI Title I teachers and regular classroom teachers. SA A ? D SD NA

4. CAI Title I staff in our school understand the role of Title I (Federal Guidelines, etc.) SA A ? D SD NA

5. Sufficient information regarding expectations, procedures and goals of the current CAI Title I program was presented to Title I instructional staff at the beginning of the program. SA A ? D SD NA

6. Communication among CAI Title I teachers from the various schools was adequate to achieve program objectives. SA A ? D SD NA

7. Communication among CAI Title I teachers and regular classroom teachers was adequate to achieve program objectives. SA A ? D SD NA

8. Communication between CAI Title I teachers and Title I parents was adequate to achieve program objectives. SA A ? D SD NA

9. Communication between CAI Title I staff and the Merrimack Education Center was adequate to achieve program objectives. SA A ? D SD NA

10. There is not enough coordination of effort between the CAI Title I program and the regular classroom program. SA A ? D SD NA

11. The program director has a good working relationship with regular school system administrators (e.g., principals). SA A ? D SD NA

INSTRUCTIONAL CONDITIONS AND STAFF							COMMENTS
1. The scheduling of CAI Title I classes was satisfactory.	SA	A	?	D	SD	NA	
2. The length of tutorial or small group periods (e.g., 20 minutes) in the CAI program was adequate.	SA	A	?	D	SD	NA	
3. Student daily contact time with the computer (e.g., 10 minutes) was about right.	SA	A	?	D	SD	NA	
4. CAI Title I children do not miss much regular classroom work.	SA	A	?	D	SD	NA	
5. The CAI Title I teachers were well prepared.	SA	A	?	D	SD	NA	
6. Instruction provided by CAI Title I teachers was excellent.	SA	A	?	D	SD	NA	
7. Students have sometimes been assigned to the CAI Title I class for remedial help (e.g., reading) when their fundamental problems appeared to be in other areas (e.g., learning disability; limited English speaking ability, emotional problems).	SA	A	?	D	SD	NA	
8. The physical characteristics of CAI instructional areas were appropriate to achieve the programs objectives.	SA	A	?	D	SD	NA	
9. Title I classes take priority over most other activities in my school so that my students receive a full period of instruction daily.	SA	A	?	D	SD	NA	
10. Most of the students enrolled in CAI Title I classes attend regularly.	SA	A	?	D	SD	NA	
11. Sufficient quantities of manuals and other materials for the CAI system were available for my use in the program.	SA	A	?	D	SD	NA	

TESTING AND BACKGROUND INFORMATION — COMMENTS

1. Student screening and placement procedures were satisfactory.	SA	A	?	D	SD	NA
2. The standardized tests used in the CAI program were appropriate.	SA	A	?	D	SD	NA
3. Sufficient diagnostic testing information was provided CAI Title I teachers on each child.	SA	A	?	D	SD	NA
4. Student records (cumulative folders, report cards, etc.) were easily accessible to CAI Title I teachers throughout the program.	SA	A	?	D	SD	NA
5. "Grade level" placement of each child by the computer system was appropriate.	SA	A	?	D	SD	NA
6. CAI system generated student reports were useful to teachers.	SA	A	?	D	SD	NA

PARENTAL INVOLVEMENT

1. There is sufficient parental involvement in the program.	SA	A	?	D	SD	NA
2. I have had the opportunity to meet with a large percentage of CAI Title I parents throughout the program.	SA	A	?	D	SD	NA
3. The CAI Title I program has been effective in fostering positive attitudinal changes in parents.	SA	A	?	D	SD	NA
4. Parents receive sufficient information about their children's progress in the CAI Title I program.	SA	A	?	D	SD	NA
5. CAI Title I parents are enthusiastic about the program.	SA	A	?	D	SD	NA
6. Parents indicated that their children enjoyed participating in the CAI Title I program.	SA	A	?	D	SD	NA
7. Parents feel that their children are doing better in school as a result of the CAI program.	SA	A	?	D	SD	NA

COGNITIVE AND AFFECTIVE CHANGES IN STUDENTS

For each row, fill in the number of your students who showed each degree of cognitive or affective change during this year's CAI Title I program.

	# Highly Positive	# Moderately Positive	# No Change	# Moderately Negative	# Highly Negative
1. personal security	____	____	____	____	____
2. self-image	____	____	____	____	____
3. self-confidence	____	____	____	____	____
4. self-control	____	____	____	____	____
5. work habits	____	____	____	____	____
6. attitude toward school	____	____	____	____	____
7. responsibility for property	____	____	____	____	____
8. classroom behavior	____	____	____	____	____
9. reading vocabulary	____	____	____	____	____
10. reading comprehension	____	____	____	____	____
11. oral reading	____	____	____	____	____
12. word attack skills	____	____	____	____	____
13. arithmetic computation	____	____	____	____	____
14. arithmetic problem solving	____	____	____	____	____
(Other)					
15. _____	____	____	____	____	____
16. _____	____	____	____	____	____
17. _____	____	____	____	____	____

NOTE: If you are not a CAI TEACHERS or CAI AIDE, proceed to the last page (p. 11) of this questionnaire. The following section is for CAI TEACHERS and AIDES only.

CAI TEACHERS AND AIDES ONLY (pp. 8-10)

CAI SYSTEMS

	YES	NO
1. Once your system became operational, has it broken down in the past year?	Y	N

2. If breakdowns occurred, how many times did they occur in each of the following areas:

a. student display unit _____

b. printer unit ("join" problems or simply unit malfunction) _____

c. local processor (the big box to which all other local equipment is connected) _____

d. telephone line connections to the central processor at the Merrimack Education Center _____

e. central processor at the Merrimack Education Center _____

f. some combination of the above not clearly discernable _____

g. other _____ _____

_____ _____

3. When breakdowns occurred,

a. was service readily available?	Y	N
b. to what extent did service correct the problem?		
Temporarily	Y	N
More or less permanently	Y	N

4. Please comment briefly on the reliability of your CAI equipment.

_____

_____

_____

5. Since your system became operational, what percent of the time would you say that it remained operational during this year's program? _____ %

6. What, if anything, could be done to improve the machinery used in the CAI system?

_____

_____

_____

_____

7. How do you rate the CAI presentation devices?

a. ease of use by students	High ___ ___ ___ ___ ___	Low
b. ease of use by teacher	High ___ ___ ___ ___ ___	Low
c. clarity of letters, numbers, etc., presented on screen	High ___ ___ ___ ___ ___	Low
d. reliability as machines	High ___ ___ ___ ___ ___	Low

8. How do you rate the CAI instructional sequences (the problems, passages, tasks) presented by the system?

a. clarity of presentation	Clear ___ ___ ___ ___ ___	Unclear
b. length of segments presented . .	Too Short ___ ___ ___ ___ ___	Too Long
c. motivational value of segments presented	Interesting ___ ___ ___ ___ ___	Dull
d. relevance to curriculum of segments presented	Relevant ___ ___ ___ ___ ___	Irrelevant
e. sequence of segments presented . . .	Clear ___ ___ ___ ___ ___	Jumbled
f. scope of segments presented . . .	Adequate ___ ___ ___ ___ ___	Inadequate
g. speed of presentation	Too Fast ___ ___ ___ ___ ___	Too Slow

9. All things considered, how do you rate the CAI instructional materials? . . . . . Poor ___ ___ ___ ___ ___ Excellent

10. What, if anything, could be done to improve the effectiveness of the instructional sequences?

_____

_____

_____

_____

_____

11. Since your CAI installation became operational, what has been the average number of minutes per week each student has interacted with the CAI system?

_____ avg. mins. /wk.

12. Since your CAI installation became operational, how many times per week has an average student been in contact with the CAI system?

_____ avg. mins. /wk.

13. On what date (approximately) did your CAI system become operational?

_____ _____
day mo.

For each of the types of information listed below:

1) in column A, please state the percent of your students for whom it has been made available to you;

2) then, in column B check any information item which you do not have, but need.

TYPE OF INFORMATION	A percent have	B need (check)	COMMENTS
achievement test scores	_____	_____	
referral sheet	_____	_____	
medical records	_____	_____	
known learning disability	_____	_____	
comments by classroom teacher	_____	_____	
adjustment or guidance records	_____	_____	
other _____	_____	_____	

How many CAI students did you have at the beginning of this year's program? _____#

How many students enrolled at the beginning of this year's program are still coming to you? _____#

How many CAI students moved during the school year? _____#

How many students withdrew from the CAI program during the school year? _____#

1. Please use the space below for any additional comments or observations you would like to make about the CAI program. (Use the back if additional space is needed).

   Weaknesses of the CAI program:

   Strengths of the CAI program:

2. If you could make <u>two changes</u> in the CAI program, what would they be?

3. Please comment below on any questions above which you feel need more complete answers.

Parental Survey Questionnaire

Title I

Computer Assisted Instruction (CAI) Program

At least one of your children has been given extra help in school this year through the Title I Computer Assisted Instruction (CAI) program in your community. The school system and CAI evaluators are interested in knowing how much you know about the program and how you feel about it.

Completing the form will take just a few minutes of your time. Please respond to the questions by putting a circle around one of the answers to the right. You are not asked to sign this form, so please answer as freely as you wish. Please return your completed questionnaire in the attached self-addressed envelope (within one week). Thank you for helping both us and your children.

Name of School System _____

Please indicate the grade level(s) and school(s) of your child(ren) in the CAI program.

Grade level(s): _____ _____ _____

School(s) _____ _____ _____

If you have more than one child receiving CAI services, answer each of the following questions as it refers to your oldest child.

1. Did you know that your child was involved in the Title I program using computer assisted instruction (CAI):	YES	NO
2. Did you know that your child was involved in the CAI Title I program in your community?	YES	NO
3. Have you been made aware of the general purpose of the CAI Title I program in which your child is receiving help?	YES	NO
4. Do you feel familiar with what the computer assisted instruction (CAI) program in Title I can do and/or is doing for your child?	YES	NO
5. Do you receive information (newsletters, newspapers, announcements) regarding CAI activities in your school or community?	YES	NO
6. Have you been invited to visit CAI Title I classes, in which your child is enrolled, to see the program in operation?	YES	NO

7.	Have you been able to discuss with teachers, often enough, the progress your child is making?	YES	NO
8.	Have you been receiving periodic information (either orally or in writing) from the Title I teacher(s) on how well your child is progressing in this CAI program?	YES	NO
9.	Does your child enjoy working with the CAI Title I teacher(s)?	YES	NO
10.	Does your child talk about CAI Title I classes at home?	YES	NO
11.	Does your child seem to enjoy school more since the beginning of the CAI Title I program?	YES	NO
12	Do you feel your child is receiving academic benefits from Title I services?	YES	NO
13.	Do you see any positive indication that your child is improving in his/her general school work since starting the CAI program?	YES	NO
14.	Is the CAI Title I program helping your child as much as you thought it would?	YES	NO
15.	Do you feel your child will be better able to succeed in school next year, as a result of attending CAI Title I classes this year?	YES	NO
16.	Do you feel that the computer assisted instruction component of Title I should be continued next year?	YES	NO
17.	Do you see any major improvements that could be made in the CAI Title I program in your community?	YES	NO

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